

**MEMORANDUM THRU:**

Robert J. Desista, Chief, Policy and Technical Support Branch

**FOR:** Rodney Howe, Project Manager, CENAE-RDC

**SUBJECT:** Suitability Determination for CITGO Terminal, Fore River, South Portland, ME, Application Number NAE-2006-03991.

**1. References Cited**

- a. US EPA Region I/USACE-NAE. 2016. Reference Memorandum for Evaluating Testing and Non-Testing Requirements of 40 C.F.R 227.6 and 227.27 Federal Navigation Dredging or Non-federal Dredging Projects, for Open Ocean Disposal at the Portland Disposal Site (PDS).
- b. USEPA Region I/USACE-NAE. 2004. Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters. Environmental Protection Agency, Region 1, Boston, MA/US Army Corps of Engineers, New England District, Concord, MA. 54 pp.
- c. USACE-NAE. 2017. Environmental Assessment/Finding of No Significant Impact for the CITGO Terminal, US Army Corps of Engineers (USACE), New England District, Concord, MA.

**2. Summary**

This memorandum addresses compliance with the regulatory evaluation and testing requirements of the Marine Protection, Research and Sanctuaries Act (MPRSA, or Ocean Dumping Act) regulations at 40 CFR 227 as well as the issues outlined in the PDS Reference Memo (USEPA Region 1/USACE-NAE 2016) for unconfined open water disposal at an ocean disposal site. Based upon this review, the proposed dredged material from the CITGO Oil Terminal is suitable for unrestricted ocean disposal at PDS. Detailed information pertaining to the regulatory issues associated with the evaluation of this project as well as the technical background of the analytical tests summarized herein is found in the PDS Reference Memo. A copy of this memo can be obtained upon request from the EPA or USACE.

### 3. **Project Description**

The applicant is proposing to dredge an area of approximately 38,803 square feet to a depth of -39' MLLW in the vessel berth, except for the trench area along the pier face where the dredge depth will be -42' MLLW; these depths include one foot of overdredge allowance. This activity will produce a volume of approximately 5,450 cu. yds. of sand and silt material. The applicant proposes to mechanically dredge this material and dispose of it at the Portland Disposal Site (PDS). This area was last dredged in 2008.

3. SPILLS AND OUTFALLS: The applicant's consultant, Andrew Nilson (Childs Engineering Corp.), reported on April 6, 2016, that there was no record of spills taking place on CITGO waterfront facility since the 2007 berth sediment testing.

### 4. **Sampling Plan:**

A sampling plan was developed by the Marine Analysis Section (MAS) on June 2, 2016 for the analysis of physical, biological and chemical characteristics of the sediment proposed to be dredged. This sampling plan was written in accordance with the USEPA Region 1/USACE-NAE Regional Implementation Manual (RIM) guidelines (USEPA Region 1/USACE-NAE, 2004). The plan called for nine cores (1 through 9) to be taken from the project area. The federal agencies concurred with this plan. This determination evaluates the results of that biological testing.

#### a. Compositing plan

Following sample collection, the samples were analyzed for physical characteristics (grain size and water content). After a review of the resulting data, a compositing plan was developed by MAS on 21 July 2016. The plan called for three composited samples for use in a bioassay with amphipods and mysids; a suspended particulate bioassay with fish, mysid shrimp, and pelagic larvae; and a bioaccumulation assay using bivalves and polychaetes. Composite A was composed of core samples 1, 2, 3 and 4. Composite B was composed of core samples 5, 6 and 7. Composite C was composed of core samples 8 and 9. The reviewing agencies concurred with this plan.

#### b. Preliminary evaluation of the 10-day toxicity test

A 10-day bioassay test was conducted on the two composite samples using two test animals: an amphipod (*Leptocheirus plumulosus*) and a mysid shrimp (*Americamysis bahia*). As the results indicated no toxic response, the

suspended particulate and the bioaccumulations tests were conducted to completion.

c. Determining contaminants of concern

The composites were then analyzed for bulk sediment chemistry according to the contaminants outlined in the sampling plan for this project. The contaminants of concern were identified as the compounds found to be elevated in the project core samples relative to the PDS reference site values. The contaminants of concern were all the metals, all the PAHs, all the PCB congeners, and all the pesticides.

## 5. Testing Results

a. 10-day bioassay and elutriate results

Mysid results: In the mysid 10-day bioassay test, performed on *Americamysis bahia*, three composites were analyzed for an acute response (see Table 1).

Table 1. 10-day Toxicity Test Results for mysid shrimp

Sample	Mean survivorship	Mean mortality	Significant difference from Reference?	Survival Difference >20%		
Lab. Control	90%	10%	No	No		
PDS Reference	83%	17%	No	No		
Composite A	90%	10%	No	No		
Composite B	93%	7%	No	No		
Composite C	98%	2%	No	No		

Statistical analysis indicates that there is no significant difference between the survivorships of the mysids exposed to the reference sediment and the mysids exposed to each of the composite sediments. Therefore, the materials proposed to be dredged are not considered acutely toxic to the mysid shrimp used in the testing.

Amphipod results: In the amphipod 10-day bioassay test, performed on *Leptocheirus plumulosus*, three composites were analyzed for an acute response (see Table 2).

Table 2. 10-day Toxicity Test Results for amphipod

Sample	Mean survivorship	Mean mortality	Significant difference from Reference?	Survival Difference >20%		
Lab. Control	96%	4%	No	No		
PDS Reference	70%	30%	No	No		
Composite A	75%	25%	No	No		
Composite B	75%	25%	No	No		
Composite C	74%	26%	No	No		

There was no statistically significant difference between the survivorships of the amphipods exposed to the reference sediment and the amphipods exposed to the sediments represented by each of the composite samples. Therefore, the materials proposed to be dredged are not considered acutely toxic to the amphipods used in the testing.

#### b. Water Column (Suspended Phase) Toxicity Tests

In the Suspended Phase Acute Toxicity Tests, the mysid shrimp (*Americamysis bahia*), the inland silverside minnow (*Menidia beryllina*), and the sea urchin larvae (*Arbacia punctulata*) LC<sub>50</sub> values when exposed to elutriate from the sediments are summarized in Table 3. Reduced LC<sub>50</sub> values were demonstrated in the sea urchin larvae when exposed to elutriate from each of the project samples.

Table 3. Suspended Phase Evaluation

Sample			
LC <sub>50</sub> Endpoint (Survival)	mysid shrimp	Inland minnow	Sea urchin larvae
Composite A	>100%	>100%	40%
Composite B	>100%	>100%	22%
Composite C	>100%	>100%	18%

Since reduced LC<sub>50</sub> values were observed for the sea urchin larvae, an STFATE water quality evaluation was performed.

#### b. STFATE Water Quality Evaluation

The ADDAMS model was run using 1% of the lowest LC<sub>50</sub> value. The results show that there is rapid dilution of the water fraction such that the

lowest LC<sub>50</sub> found, an LC<sub>50</sub> of 18% in the sea urchin larvae (*Arbacia punctulata*) is diluted to below the 1/100th value (0.18 %) within four hours following sediment disposal. This rapid dilution supports the conclusion that there should not be unacceptable adverse effects from the disposal of these sediments at the PDS. The model was run using a 4000 cu. yds. disposal volume and based on prior experience with the model, disposal volumes larger than this should also be acceptable.

c. Bioaccumulation results

A set of 28-day bioaccumulation tests were conducted on the two project composite samples. Two species were used in the tests: the bivalve, *Macoma nasuta*, and the polychaete, *Nereis virens*. Both *M. nasuta* and *N. virens* significantly accumulated contaminants at a level greater than reference. These contaminants were used to construct the risk model. See Table 4 for a detailed breakdown. All contaminants listed were included in the risk model for each composite.

d. Risk assessment analysis results

Because of the presence of significant bioaccumulation, the EPA ran a risk-assessment model of the bioaccumulation results. For these compounds, the toxicological significance of bioaccumulation from the sediment into benthic organisms was evaluated.

The risk assessment includes the evaluation of the carcinogenic risk, noncarcinogenic risk, and any observed exceedences of FDA levels. All contaminants are assessed using trophic transfer levels for lobster, fish, and shellfish. For the carcinogenic risk assessment, all samples for all contaminants were within the EPA established range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  and therefore, acceptable. For the noncarcinogenic risk assessment, all samples for all contaminants were less than the EPA established hazard quotient ratio of 1, therefore, they are acceptable. There were no exceedences with the FDA Action Levels. EPA has determined that the material is suitable for open water disposal as proposed.

CENAE-RDP

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5. If you have any questions or want further details on the procedure of project evaluation, please contact me at (978) 318-8336 or [charles.n.farris@usace.army.mil](mailto:charles.n.farris@usace.army.mil).

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U.S. Army Corps of Engineers

Concur

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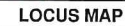
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Table 4. List of significant bioaccumulations by contaminant for each composite sample

<b><i>Macoma nasuta</i></b>	Contaminant	Composite A	Composite B	Composite C
	Metals	Arsenic	Lead	Lead
		Cadmium	Zinc	Nickel
		Chromium copper		Zinc
		lead		
		Nickel		
		Zinc		
	PAHs	Benzo(a)anthracene	Acenaphthene	Acenaphthene
		Benzo(a)pyrene	Acenaphthylene	Acenaphthylene
		Benzo(b)fluoranthene	Anthracene	Anthracene
		Benzo(k)fluoranthene	Benzo(a)anthracene	Benzo(a)anthracene
		Chrysene	Benzo(a)pyrene	Benzo(b)fluoranthene
		Fluoranthene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
		Pyrene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene
			Benzo(g,h,i)perylene	Chrysene
			Chrysene	Dibenzo(a,h)anthracene
			Dibenzo(a,h)anthracene	Fluoranthene
			Fluoranthene	Fluorene
			Fluorene	Indeno(1,2,3-c,d)pyrene
			Indeno(1,2,3-c,d)pyrene	Naphthalene
			Naphthalene	Pyrene
			Phenanthrene	
			Pyrene	
		Total PCBs	Total PCBs	Total PCBs
	Pesticides	cis-Nonachlor	cis-Nonachlor	cis-Nonachlor
		Total Chlordanes	Total Chlordanes	Total Chlordanes
		4,4'-DDD	4,4'-DDD	4,4'-DDD
		4,4'-DDE	Total DDT	Total DDT
		Total DDT	Endosulfans	Endosulfans
<b><i>Nereis virens</i></b>	Contaminant	Composite A	Composite B	Composite C
	PAHs	-----	Acenaphthene	Pyrene
			Fluorene	
			Pyrene	
		-----	Total PCBs	Total PCBs
	Pesticides	Endrin	trans-Nonachlor	-----
			4,4'-DDD	
			Heptachlor	





SCALE: NONE

**CHILDS ENGINEERING CORPORATION**  
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Designed by:	ARN	Date:	01/06/16
Drawn by:	TEQ	Design file no.	263215 X-103
Reviewed by:	DLP	Scale:	1"=40'-0"

MOTIVA TERMINAL  
CITGO / IRVING OIL  
SOUTH PORTLAND, ME

HYDROGRAPHIC SURVEY  
CONTOUR PLAN  
WITH DREDGING AREA

Sheet  
reference  
number:  
**X-103**  
Sheet 1 of 2



LIMIT OF SURVEY

SCALE: 1"=40'-0"

Citgo Terminal  
Fore River,  
S. Portland, ME

1. HYDROGRAPHIC DATA SHOWN WAS COLLECTED ON DECEMBER 8, 2015 BY CHILDS ENGINEERING CORPORATION AND CAN ONLY REFLECT CONDITIONS AS THEY EXISTED DURING THE TIME OF THE SURVEY.
2. COORDINATES ARE BASED ON THE MAINE WEST NAD 1983 STATE PLANE COORDINATE SYSTEM AND ARE EXPRESSED IN FEET.
3. ELEVATIONS ARE SHOWN IN FEET AND HUNDREDTHS AND ARE BASED ON THE MEAN LOWER LOW WATER (MLLW) DATUM. NEGATIVE VALUES REPRESENT AND ELEVATION BELOW THAT SAME PLANE.
4. WATERFRONT STRUCTURES AND CHANNEL MARKINGS ARE SHOWN FOR REFERENCE ONLY.
5. THE QUANTITY OF SOUNDINGS HAS BEEN REDUCED TO INCREASE VISIBILITY OF INDIVIDUAL ELEVATIONS.
6. THE 2009 DREDGE PRISM IS SHOWN WITHOUT SLOPED EYES. DREDGING TO A DEPTH OF ~38' MLLW WILL INCLUDE A VOLUME OF 2950 CY. INCLUDING A 1 FOOT OVERDREDGE WILL INCREASE THE VOLUME TO 5450 CY. THESE ESTIMATES INCLUDE A 10 FOOT WIDE TRENCH OF DREDGE DEPTH ~41' MLLW AND 3:1 SLOPING ON ALL SIDES EXCLUDING THE PIER SIDE WHICH WILL RECEIVE 1:1 SLOPING.

Diagram showing vertical datum relationships for the project area:

- DATUM (0.00')
- MHHW (9.89')
- MHW (9.46')
- NAVD88 (5.24')
- MLW (0.33')
- MLLW (0.00')



1"=40'-0"

40 0 40 80

SCALE IN FEET

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Designed by:	ARN		Dates:	04/05/16
Drawn by:	TEQ	Chd by:	Design file no.	263215 X-101
Reviewed by:	DLP		Scale:	1"=40'-0"

MOTIVA TERMINAL  
CITGO / IRVING OIL  
SOUTH PORTLAND, ME

HYDROGRAPHIC SURVEY  
CONTOUR PLAN

Sheet  
reference  
number:  
**X-101**  
Sheet 1 of 2



**SECTION @ STA 2+00 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 3+50 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 5+00 LOOKING WEST**

**SECTION @ STA 6+50 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 8+00 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 2+50 LOOKING WEST**  
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**SECTION @ STA 4+00 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 5+50 LOOKING WEST**  
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**SECTION @ STA 7+00 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 8+50 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 3+00 LOOKING WEST**  
SCALE: 1"=40'-0"

**SECTION @ STA 4+50 LOOKING WEST**

**SECTION @ STA 6+00 LOOKING WEST**

**SECTION @ STA 7+50 LOOKING WEST**

**SECTION @ STA 9+00 LOOKING WEST**  
SCALE: 1"=40'-0"



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Designed by:	ARN	Detail:	01/06/16
Drawn by:	TEQ	Client by:	ARN
		Design file no.:	263215 X-104
Reviewed by:	DLP	Scale:	1"=40'-0"

MOTVA TERMINAL  
CITGO / IRVING OIL  
SOUTH PORTLAND, ME

Sheet  
reference  
number:  
**X-104**  
Sheet 2 of 2